



BEMBRIDGE WINDMILL
ISLE OF WIGHT

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BEMBRIDGE WINDMILL

PREFACE.

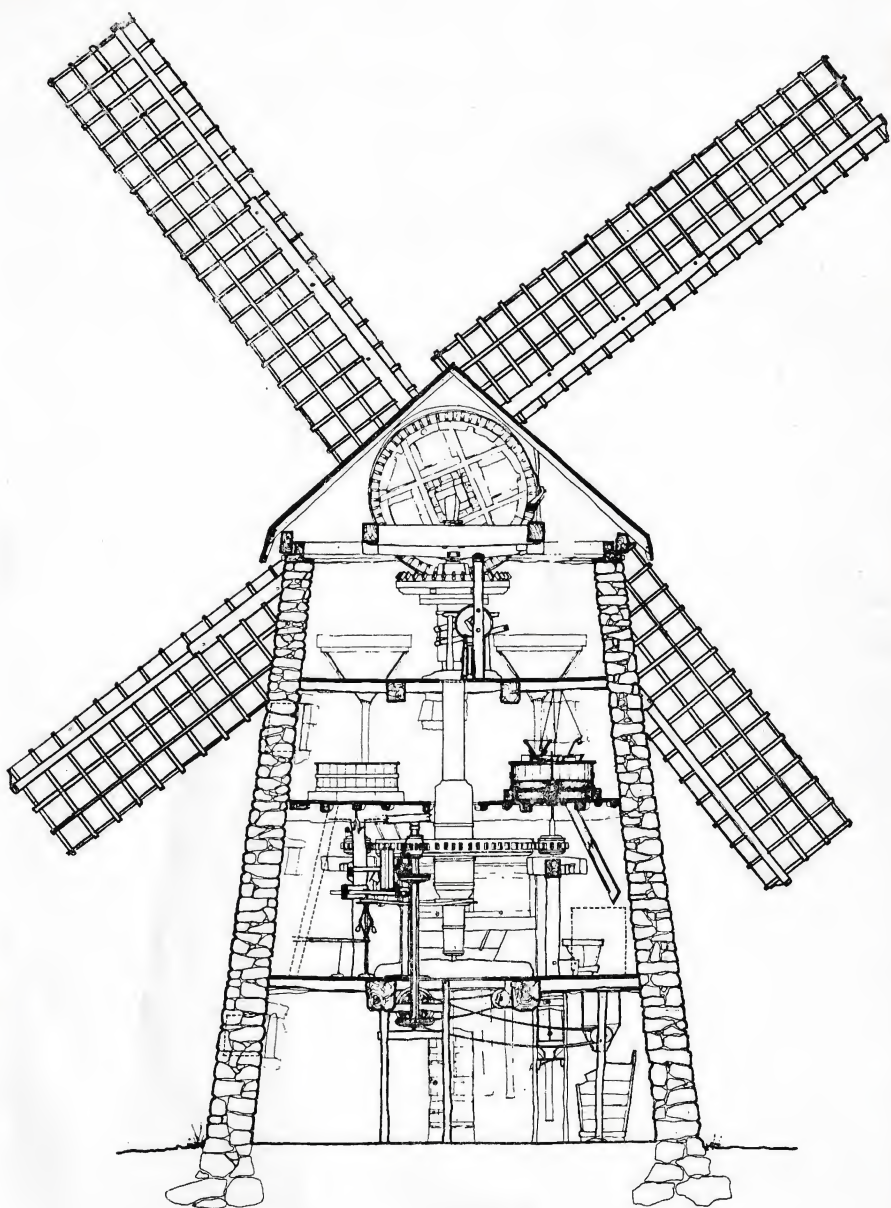
After the end of the Second World War the Bembridge Windmill presented a very melancholy sight, it was almost derelict and would soon have become only a ruin. One half of the Sweeps had disappeared and the remaining parts were in tatters. The roof was torn and the doors broken, left hanging from their hinges, and no longer a barrier to the would be trespasser. The interior had become the haunt of, and a danger to, youthful adventurers, with rotting floors and ladders. It seemed that all the effort and money spent in the restoration work done by a local committee in 1934-1935 had been in vain.

Mrs. E. Smith made her generous suggestion to the National Trust early in 1957, offering the Trust the Windmill and the land upon which it stands and so a new effort for its preservation was begun. Over £1,000 was raised by public subscription and the work carried out under the direction of Trustees, prior to the Mill becoming a National Trust property.

While this work was going on it became obvious that some form of guide would be necessary if the massive eighteenth century wooden machinery of the Mill was to have any meaning for the modern visitor. When these great wheels turned, what did they do? For what product was all this effort collected from the four winds? This little book is an attempt to answer these questions, to give meaning to what remains within the tower of the Mill and added interest to the visitor.

This would be a suitable place to record appreciation and thanks to the Trustees, for allowing this study of Bembridge Windmill to be made, to Rex Wailes and his classic book "The English Windmill" which gave both the clue and the answer to much of the mystery of the Mill and, lastly, to Mrs. Edward Smith, whose gift to the National Trust has made it possible to preserve this very fine example of the English Windmill.

T. R. Parsons



Drawing by Adrian Peel

BEMBRIDGE WINDMILL

Bembridge Windmill was in continual use until the reclamation of the land from Brading Haven, 1894-1897, and the coming of the railway. It produced flour, meal, bran and cattle feed, but from 1897 it produced only the latter. The Mill ceased work after the harvest of 1913.

During the First World War it was used as a workshop and store by Farmer Alfred O. Morris of Stanwell and Mill Farms, upon whose death it passed to his niece, Mrs. Edward Smith, along with the Mill Farm. During the 1930's restoration work was done by a local committee, the cost of which were met by public subscription, but no provision was made for its endowment and no income was assured for its maintenance. Once again the Windmill was neglected and, during the Second World War, when it served as a lookout and H.Q. for the Army and Home Guard, it lost one half of the Sweeps and became nearly derelict.

Mrs. Smith offered the Mill to the National Trust in 1957, since when it has been held, on behalf of the Trust, by local Trustees who, by public subscription, have carried out the repairs and restoration work. The Windmill was taken over by the National Trust in 1962 and is now open to the public during the summer season.

Bembridge Windmill was built in the early eighteenth century, the earliest known date in the Mill is 1746. It contains much of the original wooden machinery and is a fine example of eighteenth century craftsmanship.

It is a "Tower" or "Cap" Mill. The tower, built of local stone, some thirty eight feet in height, three feet six inches at the base and one foot six inches at the top of the stone work. The weather side is faced with "Roman Cement," the doors and windows have fine cut stone facings and it is surmounted by a wooden roof known as the "Cap." This is built four square on oak beams forming a cradle upon which the whole cap, complete with the wind shaft, interior driving wheels and the sweeps themselves, was turned to face into the wind.

As one looks at the Cap from the ground, the Turning Gear and the Steering Wheel can be seen.⁴⁵ Around

the top of the stonework is an oak curb with beech wood teeth facing outwards. These teeth are cut to fit into the eight-foot Worm Wheel, made from a single apple tree trunk, to drive the Cap around the curb. The Worm Wheel is driven by a series of wooden pinions and by the six-foot Steering Wheel. By pulling on an endless chain passing over the Steering Wheel, hanging down to the ground outside the tower, and walking around the Tower on the path at its base the Miller turned the Cap to face the required position.

The Wind Vane at the back of the Cap, made of iron and copper, now carries the device of the National Trust and replaces the old iron flag which disappeared long ago.

The Wind Shaft emerges on the face of the Cap opposite to the Steering Wheel, terminating in a cast iron Poll End which carries the four Sweeps of the Mill. These Sweeps are built up on a backbone of timber called the Whip, which is clamped and bolted to the Stock. The Stock is a thirty-foot timber, shaped and tapered from its centre, and passing through the Poll End to carry the Sweeps. Two other Sweeps being carried upon another Stock fixed at right angles to the first.

The lattice-like framework of Sail Bars and Uplongs is built upon each Whip so as to vary the angle of the surface of the sail facing the wind, the Sweep being pitched like a modern propeller. Canvas sail cloth was spread across this framework, fastened by rings and eyelets with pointing lines to permit the sail to be adjusted to the strength of the wind. Each pair of Sweeps spans, from tip to tip, some sixty feet.

Entrance to the Mill is by the large double doorway, a new oak door divided vertically down its centre ; an exact replica of the original door with wrought iron hinges, has been erected. A small door opposite the main door, also in oak, allows exit and entrance when the Sweeps are turning and passing across the main doorway. Corn sacks were unloaded at the main door and sent, by the Sack Hoist, to the Bin Floor at the top of the Mill. To reach the Bin Floor it is necessary to enter the Mill and to climb up the three ladders to the top of the tower.

THE BIN FLOOR.

The top floor of the Mill is known as the Bin Floor. Here are the Bins in which the grain was stored and from which it was fed into the Mill for grinding. Above is the wooden roof of the Cap and, lying across the Curb, are the four great beams of the Cradle upon which the whole of the structure above the stonework rests.

Across the Cradle, set at an angle of about twenty degrees to it, is the Wind Shaft, a cast iron shaft passing through the Brake Wheel and a simple bearing in the face of the Cap to the Poll End, holding the Sweeps. Above the bearing is a glazed window, replacing a wooden trap through which the Miller's Boy could reach the Poll End for the adjustment of the Sails, and at the back of the Cap is another window, also replacing a wooden trap, which gives access to the Steering Wheel and Turning Gear.

The Great Brake Wheel, eight feet in diameter, is built of oak, its beech wood teeth mesh into the teeth of the Wallower or Crown Wheel. The latter, six feet in diameter, drives the Upright Shaft—the central drive of the Mill—made from a solid oak trunk and extending through three floors to bring the power to all parts of the Mill. The bearing at the top of the Upright Shaft is a spike bearing, a simple iron spike fixed into the cross beam in the centre of the Cradle. Around the Brake Wheel is the iron brake band, secured to the Cradle at one end and to a long oak lever at the other. The lever is lifted by rope and tackle, the rope hanging down outside the tower to reach the ground level, to apply pressure to the outer rim of the Brake Wheel and so slow down the speed of the Mill. Beneath the Wallower is a small solid wooden wheel and roller with a simple lever device to operate them. This is the Sack Hoist. A rope from the roller passed over the pulleys and down to the ground through the trap door in the floor. By pressing the lever the wheel is brought into contact with the underside of the Wallower and the roller driven by friction, the sack is lifted to the trap door and, as it is raised, passes through to the Bin Floor, the trap drops behind the sack to close the opening and provide a floor upon which the sack can rest prior to its being manhandled to the side of the Bin where it is emptied. The grain then passes, by gravity, through

the canvas shutes to the Stones for grinding. Only one Bin remains today on the Bin Floor, the second was removed when the new floor joists and boards were laid during the recent restoration works.

THE STONE FLOOR.

The Stone Floor, so called because here are the stones by which the grain was ground, is reached by a short ladder. From the ceiling to the floor, and passing through it to the floor below, is the trunk of the Upright Shaft. This shaft, eighteen inches in diameter at the top, octagonal in shape, and becoming some twenty inches in diameter before it passes through the floor to the Great Spur Wheel, is the main drive of the Mill. The Great Spur Wheel is nine feet in diameter and it drives the stones from below, through pinions known as Stone Nuts. A spindle from the Stone Nut passes through the Bed Stone, a stationary stone bedded down on crossbeams just below the floor level, and terminates in the Mace across which the Runner Stone is balanced.

The Stones are housed in a wooden casing, the Tun, in which the grain is ground. Ground Meal or Flour is driven to the side of the Tun by the action of the Stones and falls through a cloth sieve into the wooden shute and is carried to the floor below. The grain is fed through canvas shutes from the Bins into the Hopper standing on the wooden frame, the Horse, resting on the top of the Tun. From this Hopper the grain enters the Shoe, a sloping tapering trough, hanging free from the top of the Horse and held by a wooden leaf spring against a three-armed spindle, the Damsel, projecting from the Mace at the top of the Runner Stone and rotated by it. The Damsel gets its name from the fact that it is never silent, always chattering, by knocking against the hard wood block on the inside of the Shoe. Its purpose is to keep the grain running smoothly down the slope of the Shoe into the centre of the Runner Stone. This flow could be adjusted by means of the cord, to alter the angle of the Shoe, which passed from the bottom of the Shoe to a Twist peg near the mouth of the Meal Shute. Across the mouth of the Hopper is a strip of leather connected by a cord to the Alarm Bell. The cord passes over two small wheels fixed in the joist above the Tun, between which, suspended over the centre of the Runner Stone, is a length of chain and

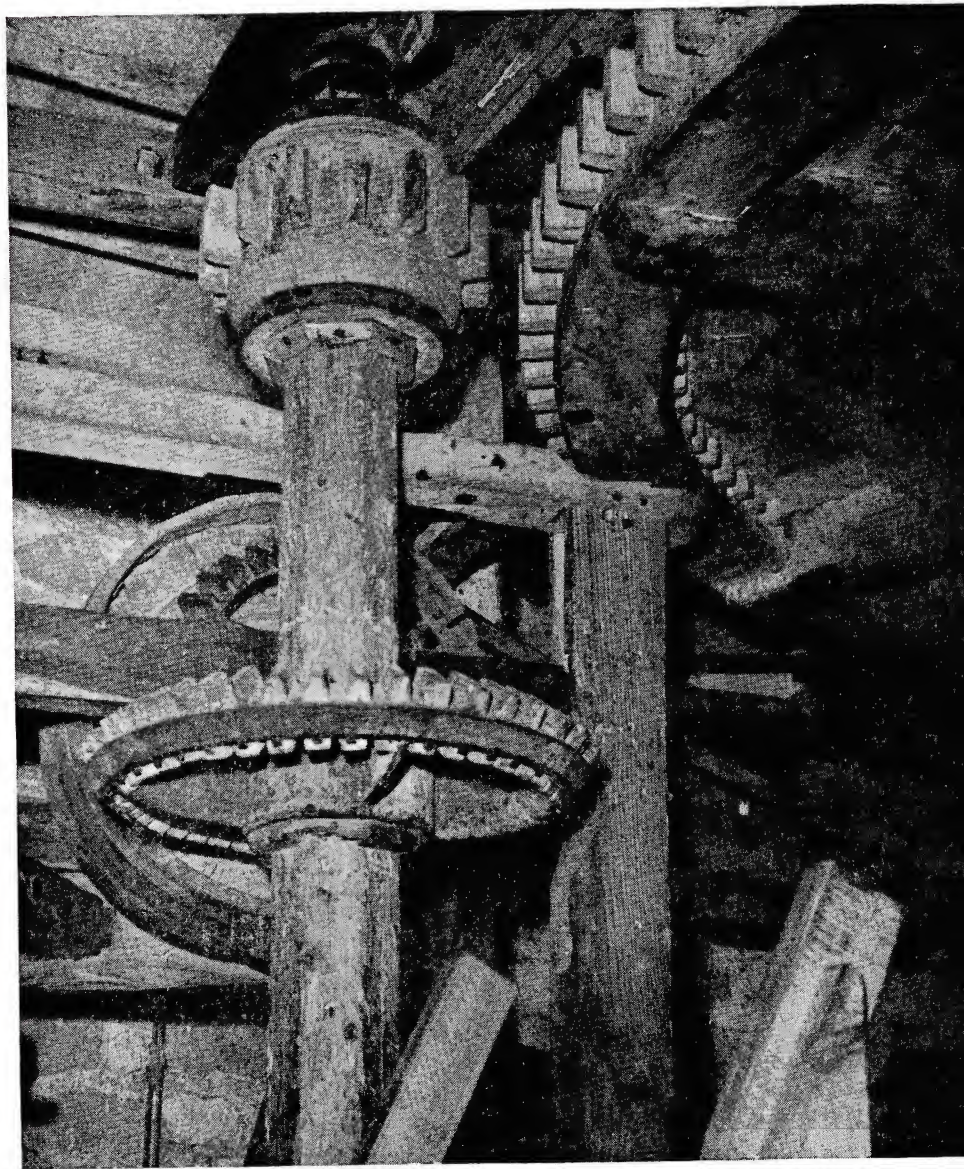
an iron hook hanging just clear of the Damsel. The weight of the grain in the Hopper is sufficient to keep the hook clear of the Damsel, but when there is no more grain in the Hopper the leather rises, the chain drops and the hook comes into contact with the Damsel, thus jerking the Alarm Bell into action. This was a very necessary precaution to avoid the risk of damage to the Stones, by clashing together, and the danger from flying sparks which could set the Tun on fire and so bring about the complete destruction of the Mill.

As the grinding proceeded the flour or meal was passed to the floor below through the wooden shutes, the bran, husks and other waste products were collected in the Tun from which they had to be shovelled into the trap in the floor leading to the shute into the large Wire Machine on the Machine Floor.

Beside the Tun is an iron Gantry, which is interchangeable between either of the two Tuns, used for lifting the Stones when the necessary dressing of the surface had to be done.

There are three unglazed windows for lighting the Stone Floor and two recesses in the wall which were used as cupboards or for holding lamps. A number of Picks and Bills, used for dressing the Stones may be seen in one of these recesses. Unfortunately the original Stones were removed from the Mill in the 1920's but the Trustees were fortunate in being able to replace them by two sets of Stones which were at the old Tide Mill at Wootton Bridge when that Mill was demolished in 1963. The iron Gantry also came from Wootton Mill. During the removal of the old Stones considerable damage was done to the woodwork and thus only one of the pair of Tuns now remains in the Mill today.

A long ladder leads down to the next floor, and it was this ladder which provided the earliest clear date found in the Mill. Owing to its dangerous condition the ladder had to be replaced and it was then found that at some previous time it had been turned head over heels, the treads were found to be worn on both faces. Thus the side against the wall had once been on the outside of the ladder and upon it was found the following inscription—E Beker 1746 AC—. The section has been preserved and it is interesting to note that the lettering is very similar to lettering seen on the wood-



work of the tentering gear on the Machine Floor, and may be by the same hand. A date in this case, though very indistinct, may well be 1701.

THE MACHINE FLOOR.

The Machine Floor is the most crowded of the three floors of the Mill, dominated by the Upright Shaft and the Great Spur Wheel, supported upon the heavy oak bearing beam in the centre of the floor. On either side of the Upright Shaft are the beams and bridge trees which carry the bearings, Stone Nuts and the Runner Stones in the Tuns on the floor above. Near the foot of the ladder is the Meal Bin and, over it, the mouth of the wooden shute from the Tun. Next to the Bin is a Hopper above a shute leading to the small Wire Machine on the Ground Floor. Following round the circle, next comes the large Wire Machine with its leather belting and driving gear from the Secondary Upright Shaft. A second Meal Shute from the Tun passes through the floor and, behind the ladder, the Governors and belting to the base of the Upright Shaft. Beside the ladder and leading down to the Ground Floor is the Secondary Upright Shaft, driven by the Great Spur Wheel, taking the drive to the floor below.

Flour and Meal flowing down the wooden shutes was bagged or sieved on the Ground Floor, or brushed through a sieve held over the Meal Bin on the Machine Floor. The remainder, caught by the sieve, was tipped into the Hopper and so passed into the small Wire Machine to be separated and graded.

Both the large and small Wire Machines are similar in construction, both are composed of a fixed wooden drum, built in two halves, covered with progressively fine wire mesh. The drum is enclosed in a cupboard-like casing. A rotary spindle carrying four or six brushes runs down the centre of the drum and is driven from the Secondary Upright Shaft.

The large Wire Machine, fed from the Stone Floor by way of the trap in the Stone Floor, separated and graded the brans and waste products coming from the two Tuns. Bran, husks and other waste products falling into the drum were brushed against the gauze, the finest quality passing through the top end of the drum and the final waste trailing out at its end to pass to the floor below to the Shaker suspended from the

ceiling of the Ground Floor. Three grades of bran separated in the large Wire Machine were discharged from the canvas shutes and bagged on the Ground Floor.

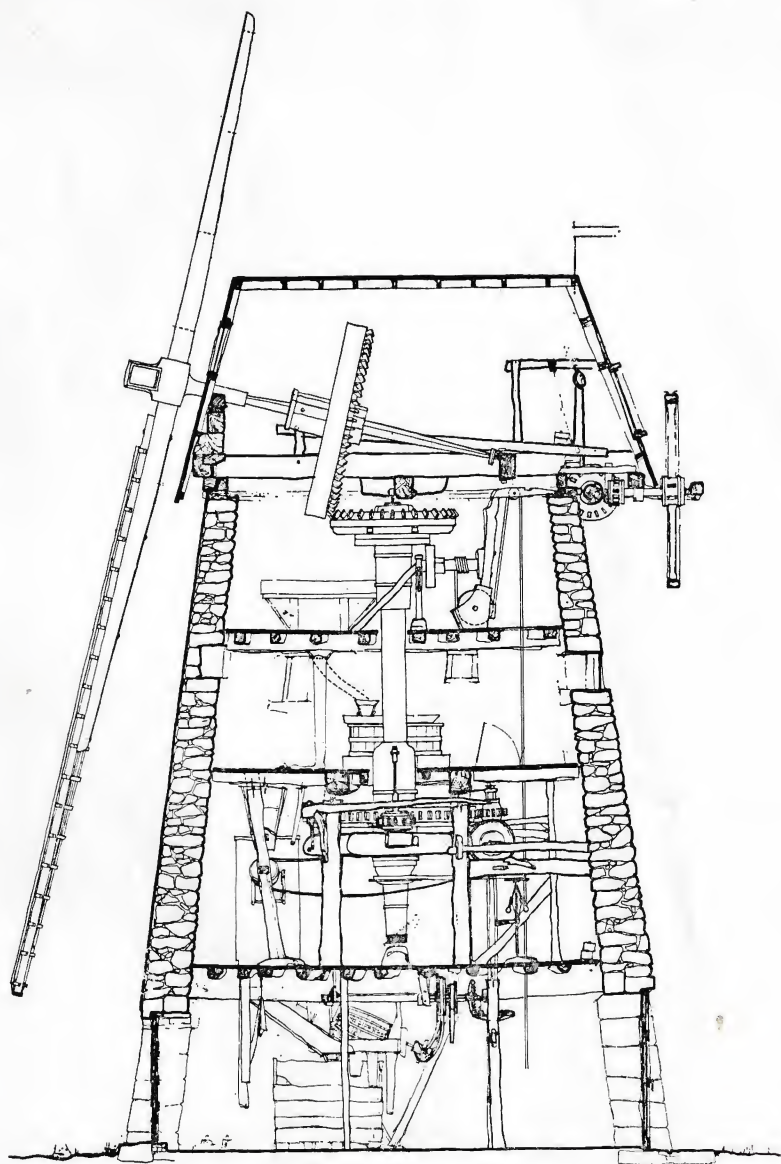
The regulation of the speed and of the gap between the Stones is one of the chief factors upon which the Miller depends for a satisfactory milled product. Ideally a steady speed and an even gap would produce the best grinding, but in a windmill this is not possible, thus an average speed and an average gap had to be obtained. This regulation is known as "tentering" and was achieved by raising or lowering the Runner Stone, according to the speed of the wind, controlled by the action of the Governors. The spindle driving the Stone Nuts is held on a thrust bearing resting on the horizontal bridge tree supported by two columns, one pair on each side of the Upright Shaft, to carry each pair of Stones. The bridge tree is pivoted at one end and is free at the other to be raised or lowered by a lever device, connected to the beam of the Governors by a length of cord. The centrifugal action of the Governors lifts or lowers the beam and so moves the lever and the bridge tree to alter the space between the Stones according to the speed of the Mill. The faster the Sweeps turned the wider became the gap between the Stones and the longer the grain took to be ground. Fine adjustments could be made by altering the tension of the operating cord by the ratchet and wheel near the mouth of the Meal Shute and by adjusting the fulcrum of the lever at the Bray and Steel Yard. The Governors were driven by belting from the Tail Wheel at the base of the Upright Shaft.

The Secondary Upright Shaft, driven by the Great Spur Wheel, extends between the Machine Floor and the Ground Floor, driving the Wire Machine and the Shaker.

THE GROUND FLOOR.

The Ground Floor is the receiving end of the Mill, from here the incoming grain is offloaded at the main door and sent up to the Bin Floor by the Sack Hoist. Here too are the canvas shutes through which the flour, bran middlings and meal is delivered from the Stones and machines on the floors above.

Immediately in front of the Main Door is the ladder from the Machine Floor and, above it, open to all floors



Drawing by Adrian Peel

of the Mill, is the well reaching to the trap door in the Bin Floor and the Sack Hoist. To the left of the ladder is a small bridge tree supporting the lower end of the Secondary Upright Shaft and from it the belting extending to the small Wire Machine and the Shaker.

The small Wire Machine, fed from the Hopper beside the Bin on the Machine Floor, dresses and separates the flour as it is brushed through the drum, to fall as it is graded down the canvas shutes suspended from the base of the machine over the Bin.

The Shaker, into which the waste from the large Wire Machine is discharged, hangs from the ceiling. This machine consists of a double sloping sieve of graded wire mesh, the inner trough hanging free of the outer trough. To the lower end is attached a leather strap which in turn is fixed to a wooden rod, the latter passing over a roller and its end is attached to an eccentric point in the face of a small driving wheel. Driven by the belt from the Secondary Upright Shaft the rod is jerked by the eccentric action from the wheel and the inner trough is jumped up and down to sieve the waste pollard from the husks.

Hanging from the end of the shute is a simple device for keeping a sack open at the neck while being filled. In front of the small doorway are three canvas shutes from the large Wire Machine, which discharged bran, middlings and meal, and to the left of the bridge tree is another shute which discharged meal direct from the Stone Floor. A Ratchet and Wheel on the wall near this shute is the adjustment of the tentering gear.

Swan-necked Beam Scales hang from the ceiling complete with their wooden weight holders and cradles for holding upright the sacks for filling and weighing. The small scales have iron pans and scoops for holding lesser quantities of grain, flour or meal, and there is also a set of iron kitchen scales and sets of weights dating from the reigns of George IV, William IV and Queen Victoria. Two sets of scales were brought from Wootton Mill when the latter was demolished.

Light is provided to the Ground Floor by a single window in the south face of the tower and by the openings of the two doorways. At the main door, set as a doorstep, is an old mill stone, probably the last remaining stone of an original pair of eighteenth century stones.

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